



**QD-M-005
REVISION D**

EFFECTIVE DATE: October 15, 2004

George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

ORGANIZATIONAL INSTRUCTION

MAINTAINABILITY DEMONSTRATION

OPR(s)

**QD10, Qd20, QD30,
QD40**

OPR DESIGNEE

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		11/19/97	
Revision	A	7/1/99	Changes made to reflect new organization code changes and/or Changes made to reflect new directives renumbering scheme
Administrative	N/A	8/28/00	OPR and/or OPR Designee change due to personnel transfer or other administrative reason. No other change to the document has been made.
Revision	B	09/04/02	Format and numbering change to implement requirements of QS-A- 001 rev F.
Revision	C	10/20/03	Complete revision
Revision	D	10/15/04	Updated OI to implement HQ Rules Review in accordance with CAITS Action # 04-DA-01-0387) (Utilizing the word "Shall" for all requirements, removing ambiguity, removing non-requirements, etc.)

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Maintainability Demonstration

1. PURPOSE, SCOPE, APPLICABILITY

1.1 Purpose

The purpose of this Organizational Instruction (OI) is to describe the process for Maintainability Demonstration testing.

1.2 Scope

This OI provides procedures that shall be used in the planning, evaluation, and approval of Maintainability Demonstration.

1.3 Applicability

This OI is applicable to all S&MA personnel supporting MSFC programs/projects that have Maintainability Demonstration requirements imposed.

2. DOCUMENTS (Applicable and/or Reference)

2.1 Applicable Documents

NPD 8720.1	NASA Reliability and Maintainability (R&M) Program Policy
NASA-STD-8729.1	Planning, Developing and Managing an Effective Reliability and Maintainability (R&M) Program
MPD 8720.1	MSFC Reliability and Maintainability Program for Space Systems

2.2 Reference Documents

MIL-STD-470	Maintainability Program for Systems and Equipment
MPG	Maintenance Planning Guide – Air Force Aeronautical Systems Center – 1 Nov 2001

3. DEFINITIONS

All definitions applicable to this OI are addressed in NASA-STD-8729.1

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4. INSTRUCTIONS

Maintainability demonstration testing shall be conducted during the program/project Implementation phase, where warranted by design complexity or other related factors, to supplement or validate the maintainability analyses. Maintainability demonstration shall be used to verify compliance with quantitative maintainability requirements and/or to ensure that all preventive and corrective maintenance activities can be successfully executed in the scope of the program/project maintenance concept.

The objective of the maintainability demonstration is to gather “hands-on” maintenance experience with the actual design configuration. Informal maintainability demonstrations may be performed using mockups or non-baseline design configurations to serve as input to trade studies or for risk reduction purposes. Early in the design phase, demonstration shall be accomplished using electronic models to simulate removal and replacement operations. This type of simulation shall be used to ensure that the system can be maintained in the manner proposed, at the existing low fidelity level of design. Later in the design process, formal maintainability demonstrations are to be used. These demonstrations used for verification purposes shall utilize high fidelity mock-ups that accurately represent the operational maintenance environment of the design in terms of accessibility, equipment interfaces, and environmental conditions. Where practical, engineering models or actual flight hardware shall be utilized for maintainability demonstrations in order to gather the most realistic data in the most relevant environment. The demonstrations used shall be shown to be traceable to the final design and operational concepts for them to be of any practical value.

Planning for maintainability demonstration shall begin early in the program/project Implementation phase. A Maintainability Demonstration Plan shall be developed in order to ensure proper coordination of test objectives, equipment to be tested, and resources. MIL-STD-470 shall be used for guidance in development of the Maintainability Demonstration Plan. The results of maintainability demonstrations shall be reported via a formal Maintainability Demonstration Report to ensure that the data is appropriately disseminated and utilized. Communication of this data to the design team is critical in ensuring that the maintainability effort has an opportunity to influence the design.

5. NOTES

5.1 Records

Record	Repository	Period of Time
Maintainability Test Procedure	As specified by the project plan.	As specified by the project plan.
Maintainability Test Report		

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6. SAFETY PRECAUTIONS AND WARNING NOTES

None.

7. APPENDICES, DATA, REPORTS, AND FORMS

None.

8. RECORDS

None

9. TOOLS, EQUIPMENT, AND MATERIALS

The user and/or program define any tools, special equipment, or materials used during the maintainability demonstration process. Program specified tools shall have preference over user defined tools, materials and processes.

10. PERSONNEL TRAINING AND CERTIFICATION

Training shall include maintainability demonstration and analysis.

11. FLOW DIAGRAM

None.